

SIPROTEC

Distance protection  
7SA522, 7SA6

Communication module

PROFIBUS-DP  
Bus mapping

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The information in this manual is checked periodically, and necessary corrections will be included in future editions.

We appreciate any suggested improvements.

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# Preface

## Purpose of this manual

This manual describes the data in the PROFIBUS-DP messages of the SIPROTEC devices 7SA522, 7SA6 and is divided into the following topics:

- Data of the PROFIBUS-DP messages → Chapter 1,
- Standard mapping 3-1 → Chapter 2,
- Standard mapping 3-2 → Chapter 3.

General details about the function, operation, assembly and commissioning of the SIPROTEC devices you find in the

- SIPROTEC4 System Manual, order no. E50417–H1176–C151.

## PROFIBUS-DP communication profile documentation

The following additional manual informs you about the data types, bus specific parameters and hardware interface of the PROFIBUS-DP slave modul of the SIPROTEC devices:

Manual	Order number
SIPROTEC Communication module, PROFIBUS-DP - Communication profile	C53000-L1840-B001-03

## PROFIBUS-DP specification

The PROFIBUS-DP specification and the structure of the PROFIBUS-DP messages are defined in the European Standard EN 50170:

- PROFIBUS Specification  
Normative Parts of PROFIBUS-FMS, -DP, -PA  
According to the European Standard  
EN 50170, Volume 2  
PROFIBUS Nutzerorganisation e.V.

<b>Validity</b>	<p>This manual is valid for the SIPROTEC devices:</p> <ul style="list-style-type: none"><li>• 7SA522, 7SA6 (firmware version 4.20 or higher)</li></ul> <p>with</p> <ul style="list-style-type: none"><li>• PROFIBUS-DP communication module version 02.00.05 or higher,</li><li>• PROFIBUS-DP communication module version 03.00.03 or higher at use of</li><li>• Standard mapping 3-2.</li></ul> <p>For device parameterization have to be used:</p> <ul style="list-style-type: none"><li>• DIGSI 4.30 or higher,</li><li>• DIGSI 4.21 considering the preconditions explained in the manual “SIPROTEC Communication module, PROFIBUS-DP - Communication profile” (ref. to page 3),</li><li>• PROFIBUS-DP standard mappings 3-1 to 3-n (n = device type dependent number of standard mappings).</li></ul>
<b>Additional Support</b>	<p>For questions regarding SIPROTEC4 devices, please contact your Siemens representative.</p>
<b>Training courses</b>	<p>Individual course offerings may be found in our Training Catalog and questions can be directed to our Training Centre. Please contact your Siemens representative.</p>
<b>Target audience</b>	<p>Protection engineers, commissioning engineers, personnel concerned with adjustment, checking and service of selective protective equipment, automatic and control facilities and personnel of electrical facilities and power plants.</p>



## Warning!

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety rules can result in severe personal injury or property damage.

Only qualified personnel shall work on and around this equipment after becoming thoroughly familiar with all warnings and safety notices of this and the associated manuals as well as with the applicable safety regulations.

The successful and safe operation of this device is dependent on proper transport and storage, proper handling, installation, operation, and maintenance by qualified personnel under observance of all warnings and hints contained in this and the associated manuals.

In particular the general erection and safety regulations (e.g. IEC, EN, DIN, VDE, or other national and international standards) regarding the correct use of high-voltage installations must be observed. Non-observance can result in death, personal injury or substantial property damage.

### QUALIFIED PERSONNEL

For the purpose of this manual and product labels, a qualified person is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, he has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.

### Typographic and graphical conventions

The following text formats are used to identify concepts giving device information described by the text flow:

**Parameter names**, or identifiers for configuration or function parameters that appear in the device display or on the screen of a PC (with DIGSI) are shown in mono-script (same point size) bold text. This also applies to header bars for selection menus.

**Parameter conditions**, or possible settings of parameters that appear in the device display or on the screen of a PC (with DIGSI), are additionally shown in italic style. This also applies to selection items for selection menus.

„Annunciations“, or identifiers for information produced by the device or required by other devices or from the switchgear is shown in mono-script (same point size) and placed into quotation marks.

For diagrams in which the identifier type results from the representation itself, text conventions may differ from the above-mentioned.



# Revision index

Listing of the changes between the editions of this manual:

Modified chapters / pages	Edition	Reasons of modification
	1.0	First edition, Doc.-No.: C53000-L1840-B007-03 Oct. 2 <sup>nd</sup> , 2001
general Chap. 1.4, 3	2.0	<ul style="list-style-type: none"><li>• Page numbering in the manual now continuous, not chapter-related any more</li><li>• New: description of Standard mapping 3-2 with event list</li></ul> Dec. 21 <sup>st</sup> , 2004





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## Data of the PROFIBUS-DP messages

This chapter delivers explanations to the data descriptions of the standard mappings as well as notes for evaluation of selected SIPROTEC objects and for the configuration of the standard mapping in the PROFIBUS-DP master.

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## 1.1 Explanations



*Note:*

The examples shown in this chapter 1.1 do not necessarily correspond to the real allocation of the objects in the bus mapping.

Chapters 2 and 3 define the data area of the PROFIBUS-DP messages for data transfer between the PROFIBUS-DP slave of the SIPROTEC devices 7SA522, 7SA6 and the PROFIBUS-DP master.

The columns "Designation of the SIPROTEC objects" contain the names of the SIPROTEC objects for "US English" device language.

The listed SIPROTEC objects in the PROFIBUS-DP messages' data area are sorted after byte offset, beginning with 0.

### Variables with data type greater than or equal to 1 byte

The offset defines the start of the most significant byte in the message, e.g.:

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
10	Ia =	Current in phase A	3276.7 A	601

The measured value "Ia" is assigned to data byte 10 (most significant byte of the measured value) and data byte 11 (least significant byte of the measured value) in the PROFIBUS-DP message

### Bit variables (SP/SC, DP/DC)

The offset indicates the byte which contains the bit value and the position of bit 0 of the bit variable, e.g. (input message):

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	Q0 ON/OFF OFF	Circuit breaker	-
0 / 1	Q0 ON/OFF ON		

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
17 / 4	Fail Ph. Seq.	1 = Failure: Phase Sequence	171

The checkback signal from the circuit breaker (as double-point indication) is located in data byte 0, bit positions  $2^0$  (bit 0) and  $2^1$  (bit 1).

The single-point indication "Fail Ph. Seq." is located in byte 17, bit position  $2^4$ .



*Note:*

The definition of the data types (single-point indication, double-point indication, measured value etc.) are contained in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile" (ref. to page 3).

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## 1.2 Messages in output direction: PROFIBUS-DP master to the SIPROTEC device

The messages in PROFIBUS-DP output direction (ref. to chap. 2.1 and 3.1) allow:

- command outputs through the output relays of the SIPROTEC devices (external commands),
- manipulation of taggings (internal commands).



*Note:*

- The allocation of the output relays to the switching devices and to the output channels is defined during parameterization of the SIPROTEC devices.
  - Depending on the device composition there may be less than indicated output relays (and corresponding PROFIBUS-DP message positions) available in the SIPROTEC device.
-

## 1.3 Messages in input direction: SIPROTEC device to the PROFIBUS-DP master

The messages in PROFIBUS-DP input direction (ref. to chap. 2.2 and 3.2) allow:

- polling of switching devices' status and binary inputs,
- transmission of annunciations, measurands and meter values to the PROFIBUS-DP master.

### 1.3.1 Annunciations



*Note:*

- The allocation of the input channels to the binary inputs is defined during parameterization of the devices.
  - Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding PROFIBUS-DP message positions) may be available in the SIPROTEC device.
- 

### 1.3.2 Measured values



*Note:*

Depending on the device composition not all of the indicated analog inputs (and corresponding PROFIBUS-DP message positions) may be available in the SIPROTEC device.

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The given default scaling values for the measured values in the standard mappings apply to installations with the following nominal operating values:

Full Scale Voltage (parameter address 1103):

→ 100.01 ... 1000 kV

Full Scale Current (parameter address 1104):

→ 10.01 ... 1000 A

Product of:

- Rated Primary Voltage (parameter address 0203) and
- Matching ratio Phase-VT to Open-Delta-VT (parameter address 0211):  
→ 100.01 ... 1000 kV

Product of:

- CT Rated Primary Current (parameter address 0205) and
- Matching ratio  $I_4/I_{ph}$  for CT's (parameter address 0221)  
→ 10,01 ... 1000 A

Power values:

- Product of Full Scale Voltage and Full Scale Current multiplied by  $\sqrt{3}$   
→ 100,01 ... 1000 MW (MVAR)



*Note:*

Changes of the scaling of the measured values are possible in adaption of the concrete installation environment.

You find information about this in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile" (ref. to page 3).

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### 1.3.3 Metered measurands

#### Scaling

The scaling of the metered measurands which are derived from measured values ("Wp+", "Wq+", "Wp-", "Wq-") refers to:

**60000 Impulses per hour for  $V = V_{nom}$  and  $I = I_{nom}$**

$V_{nom}$  = Full Scale Voltage (parameter address = 1103)

$I_{nom}$  = Full Scale Current (parameter address = 1104)

#### Example

In the parameter set is configured:

$I_{nom} = 1000$  A and  $U_{nom} = 400$  kV,

60000 impulse corresponds so that:

$1 \text{ h} * 1000 \text{ A} * 400 \text{ kV} * \sqrt{3} = 692.82 \text{ MWh}$



*Note:*

- The type of the update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parameterization software DIGSI.
  - The scaling of the metered measurands at binary inputs (pulse counters) depends on the externally connected pulse generator.
-



## 1.4 Configuration data of the standard mappings

There are two standard mappings (standard mapping 3-1 and standard mapping 3-2) available for the SIPROTEC devices 7SA522, 7SA6 which differ in the data size of the PROFIBUS-DP messages.

### Standard mapping 3-1

*The standard mapping 3-1 contains:*

Output direction:

- 5 Double commands
- 19 Single commands

Input direction:

- 5 Double-point indications
- 70 Single-point indications
- 17 Measured values (Integer)
- 4 Metered measurands (Unsigned Long)
- 4 Integer values for fault locator and statistics

### Standard mapping 3-2

*The standard mapping 3-2 contains:*

Output direction:

- Handshake byte for event list via PROFIBUS-DP
- 5 Double commands
- 11 Single commands

Input direction:

- 5 Double-point indications
- 86 Single-point indications
- 19 Measured values (Integer)
- 1 Integer value for fault locator
- 4 Metered measurands (Unsigned Long)
- Handshake byte and three message blocks for event list via PROFIBUS-DP

### Configuration data

*Standard mapping 3-1:* **1FH 1FH 1FH 1FH 13H 25H**

(68 bytes input-, 6 bytes output direction)

*Standard mapping 3-2:* **1FH 1FH 1FH 1FH 13H DFH 25H**

(100 bytes input-, 6 bytes output direction)

**PROFIBUS-DP master**

At the configuration of a PROFIBUS-DP slave of the SIPROTEC devices in the parameterization system of the PROFIBUS-DP masters are to select the following modules for the 7SA522, 7SA6 standard mappings and to allocate associated addresses in the I/O addressing range of the PROFIBUS-DP master:

*Standard mapping 3-1:*

Module	Order number	Input address	Output address
0	Input - 16 Bytes	Adr_lx	
1	Input - 16 Bytes	Adr_lx + 16	
2	Input - 16 Bytes	Adr_lx + 32	
3	Input - 16 Bytes	Adr_lx + 48	
4	Input - 4 Bytes	Adr_lx + 64	
5	Output - 6 Bytes		Adr_Ox

*Standard mapping 3-2:*

Module	Order number	Input address	Output address
0	Input - 16 Bytes	Adr_lx	
1	Input - 16 Bytes	Adr_lx + 16	
2	Input - 16 Bytes	Adr_lx + 32	
3	Input - 16 Bytes	Adr_lx + 48	
4	Input - 4 Bytes	Adr_lx + 64	
5	Input - 16 Words, consistent	Adr_lx + 68	
6	Output - 6 Bytes		Adr_Ox

Adr\_lx and Adr\_Ox indicate arbitrary (as a rule even) addresses in the I/O addressing range of the PROFIBUS-DP master.

Adr\_lx (base address of the inputs) is identical with offset 0 of the PROFIBUS-DP message data of the SIPROTEC device in input direction (ref. to chap. 2.2 and 3.2).

Adr\_Ox (base address of the outputs) is identical with offset 0 of the PROFIBUS-DP message data of the SIPROTEC device in output direction (ref. to chap. 2.1 and 3.1).



*Note:*

There is dependently on the PROFIBUS-DP master in addition possibly the demand to put the base address of the inputs on a value divisible by four so that accesses on the metered measurands (unsigned long values, ref. to chap. 2.2.4 and 3.2.4) can be correctly carried out in the PROFIBUS-DP master.

## 1.5 Notes to SIPROTEC objects

This chapter contains notes for the use and evaluation of certain SIPROTEC objects.



*Note:*

- The description of the standard mappings (ref. to chap. 2 and 3) contains the pre-allocation of the mapping files at delivery or at first assignment of a mapping in DIGSI to the SIPROTEC device.
- Changes of the allocation and the scaling of the measured values are possible in adaptation to the concrete installation environment.  
You find information about this in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile" (ref. to page 3).
- If a mapping file is assigned to a SIPROTEC device and if the data size of the PROFIBUS-DP message of this SIPROTEC device is changed by choice of a new mapping file then assignments which are not available in the existing mapping file remain unassigned furthermore.

### 1.5.1 Control mode REMOTE

Control mode with control authority is REMOTE, option of unlocked control with PROFIBUS-DP

- Changing the "Control mode REMOTE" to UNLOCKED permits one unlocked control operation via PROFIBUS-DP.  
After execution of the command, the "Control mode REMOTE" in the SIPROTEC device will automatically be reset to LOCKED.
- A programmed test "Switch in position" for unlocked control operations is always be executed.
- If, after changing the "Control mode REMOTE" to UNLOCKED, no command is received via PROFIBUS-DP for a period of 5 minutes, then the "Control mode REMOTE" is automatically reset to LOCKED.
- If the "Control mode REMOTE" was automatically reset to LOCKED by the SIPROTEC device then this status can be recognized by the corresponding bit in the PROFIBUS-DP input message.  
In this case the status of "Control mode REMOTE" in output direction has to be updated by the PROFIBUS-DP master.

#### References

*Standard mapping 3-1:* ref. to chap. 2.1.2

*Standard mapping 3-2:* not pre-allocated

## 1.5.2 Changing the setting group

In order to change the setting group, the value "10" = ON must be transmitted for the corresponding pair of bits and afterwards be reset to "00" = "Quiescent status" (controlled by an impulse from the PROFIBUS-DP master).

- Switching ON one setting group automatically switches OFF the current active setting group.
- Transmission of the value "01" = OFF is insignificant for the change of the setting group and is refused by the device.
- A change of the setting group is only possible via PROFIBUS-DP if the parameter **Change to Another Setting Group** (parameter address = 302) has the value **Protocol**.

**References**            *Standard mapping 3-1:* ref. to chap. 2.1.2  
                              *Standard mapping 3-2:* ref. to chap. 3.1.3

## 1.5.3 Stop data transmission

The functionality "Stop data transmission" is not supported via PROFIBUS-DP communication.

If "Stop data transmission" is active nevertheless data via PROFIBUS-DP will be transferred furthermore.

The annunciation "DataStop" signals the activation of "Stop data transmission" however and can be evaluated correspondingly in the PROFIBUS-DP master.

**References**            *Standard mapping 3-1:* ref. to chap. 2.2.1.3  
                              *Standard mapping 3-2:* ref. to chap. 3.2.1.5

## 1.5.4 Fault locator

Always the latest fault location is stored.

In the event of a fault, reading out of the fault record protocol from the SIPROTEC device is necessary for an exact diagnosis.

**References**            *Standard mapping 3-1:* ref. to chap. 2.2.3  
                              *Standard mapping 3-2:* ref. to chap. 3.2.3

## Standard mapping 3-1

This chapter describes the data in the PROFIBUS-DP messages between the PROFIBUS-DP master and the SIPROTEC devices 7SA522, 7SA6 if standard mapping 3-1 is selected.

2.1	Message in output direction	22
2.2	Message in input direction	25

## 2.1 Message in output direction

### 2.1.1 Double commands

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	52Breaker OFF	Impulse output, 3 relays (2-pole ON, 1-pole OFF)	-
0 / 1	52Breaker ON		
0 / 2	Disconnect Switch OFF	Impulse output, 2 relays, 1-pole	-
0 / 3	Disconnect Switch ON		
0 / 4	Ground Switch OFF	Impulse output, 2 relays, 1-pole	-
0 / 5	Ground Switch ON		
0 / 6	Q2 Open/Close OFF	Impulse output, 2 relays, 1-pole	-
0 / 7	Q2 Open/Close ON		
1 / 0	Q9 Open/Close OFF	Impulse output, 2 relays, 1-pole	-
1 / 1	Q9 Open/Close ON		

### 2.1.2 Internal commands

- Ref. to chap. 1.5.1 and 1.5.2 for notes regarding “Control mode REMOTE” and Changing the setting group.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 2	79 OFF	Deactivation of “Autoreclosing”	2782
1 / 3	79 ON	Activation of “Autoreclosing”	
1 / 4	Protection OFF	Deactivation of protection functions	52
1 / 5	Protection ON	Activation of protection functions	
1 / 6	Pilot OFF	Deactivation of Pilot Protection	4051
1 / 7	Pilot ON	Activation of Pilot Protection	

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	Mode REMOTE	Control mode REMOTE = LOCKED	-
2 / 1	Mode REMOTE	Control mode REMOTE = UNLOCKED	
2 / 2	Setting group A		-
2 / 3	Setting group A	Activation of setting group A	
2 / 4	Setting group B		-
2 / 5	Setting group B	Activation of setting group B	
2 / 6	Setting group C		-
2 / 7	Setting group C	Activation of setting group C	
3 / 0	Setting group D		-
3 / 1	Setting group D	Activation of setting group D	

### 2.1.3 Single commands and taggings

- Single commands and taggings can be routed on these position as “Source system interface” using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 2	<user-defined> OFF	not pre-allocated	-
3 / 3	<user-defined> ON		
3 / 4	<user-defined> OFF	not pre-allocated	-
3 / 5	<user-defined> ON		
3 / 6	<user-defined> OFF	not pre-allocated	-
3 / 7	<user-defined> ON		
4 / 0	<user-defined> OFF	not pre-allocated	-
4 / 1	<user-defined> ON		
4 / 2	<user-defined> OFF	not pre-allocated	-
4 / 3	<user-defined> ON		
4 / 4	<user-defined> OFF	not pre-allocated	-
4 / 5	<user-defined> ON		
4 / 6	<user-defined> OFF	not pre-allocated	-
4 / 7	<user-defined> ON		
5 / 0	<user-defined> OFF	not pre-allocated	-
5 / 1	<user-defined> ON		

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 2	<user-defined> OFF	not pre-allocated	-
5 / 3	<user-defined> ON		
5 / 4	<user-defined> OFF	not pre-allocated	-
5 / 5	<user-defined> ON		
5 / 6	<user-defined> OFF	not pre-allocated	-
5 / 7	<user-defined> ON		



## 2.2 Message in input direction

### 2.2.1 Annunciations

#### 2.2.1.1 Double-point indications

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	52Breaker OFF	Double-point indication ON/OFF	-
0 / 1	52Breaker ON		
0 / 2	Disconnect Switch OFF	Double-point indication ON/OFF	-
0 / 3	Disconnect Switch ON		
0 / 4	Ground Switch OFF	Double-point indication ON/OFF	-
0 / 5	Ground Switch ON		
0 / 6	Q2 Open/Close OFF	Double-point indication ON/OFF	-
0 / 7	Q2 Open/Close ON		
1 / 0	Q9 Open/Close OFF	Double-point indication ON/OFF	-
1 / 1	Q9 Open/Close ON		

#### 2.2.1.2 Single-point indications and taggings

- Protection annunciations, single-point indications and taggings can be routed on these position as "Destination system interface" using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 2	<user-defined>	not pre-allocated	-
1 / 3	<user-defined>	not pre-allocated	-
1 / 4	<user-defined>	not pre-allocated	-
1 / 5	<user-defined>	not pre-allocated	-
1 / 6	<user-defined>	not pre-allocated	-
1 / 7	<user-defined>	not pre-allocated	-
2 / 0	<user-defined>	not pre-allocated	-
2 / 1	<user-defined>	not pre-allocated	-

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 2	<user-defined>	not pre-allocated	-
2 / 3	<user-defined>	not pre-allocated	-
2 / 4	<user-defined>	not pre-allocated	-
2 / 5	<user-defined>	not pre-allocated	-
2 / 6	<user-defined>	not pre-allocated	-
2 / 7	<user-defined>	not pre-allocated	-

### 2.2.1.3 Status indications

- Ref. to chap. 1.5.3 for notes regarding “Stop data transmission”.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 0	79 ON	1 = 79 Auto recloser is switched ON	2782
3 / 1	Pilot ON	1 = Pilot Prot. is switched ON	4051
3 / 2	ProtActive	1 = At least one protection function is active	52
3 / 3	DataStop	1 = Stop data transmission is active	-
3 / 4	Test mode	1 = Test mode is active	-
3 / 5	Settings Calc.	1 = Setting calculation is running	70
3 / 6	Group A	1 = Setting group A is active	-
3 / 7	Group B	1 = Setting group Bis active	-
4 / 0	Group C	1 = Setting group Cis active	-
4 / 1	Group D	1 = Setting group D is active	-
4 / 2	Control Auth.	Control Authority (0 = REMOTE, 1 = LOCAL)	-
4 / 3	ModeLOCAL	Controlmode LOCAL (0 = LOCKED, 1 = UNLOCKED)	-
4 / 4	ModeREMOTE	Controlmode REMOTE (0 = LOCKED, 1 = UNLOCKED)	-
4 / 5	Data valid	1 = Data in the PROFIBUS-DP message are valid. (This indication is created by the PROFIBUS-DP slave; not available in DIGSI and not relocatable.)	-

**2.2.1.4 Monitoring information**

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
4 / 6	Fail I Superv.	1 = Failure: General Current Supervision	161
4 / 7	Fail V Superv.	1 = Failure: General Voltage Supervision	164
5 / 0	Fail Ph. Seq.	1 = Failure: Phase Sequence	171
5 / 1	<user-defined>	not pre-allocated	-
5 / 2	Emer. mode	1 = Emergency mode	2054
5 / 3	>FAIL:Feeder VT	1 = Binary input "Failure: Feeder VT (MCB tripped)" is active	361
5 / 4	85-21 Carr.Fail	1 = 85-21 Carrier CHANNEL FAILURE	4055
5 / 5	Alarm Sum Event	1 = Alarm Summary Event	160
5 / 6	Error Sum Alarm	1 = Error with a summary alarm	140

**2.2.1.5 Sensitive ground fault protection**

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 7	Sens. Gnd Ph A	1 = Sensitive Ground fault picked up in Ph A	1272
6 / 0	Sens. Gnd Ph B	1 = Sensitive Ground fault picked up in Ph B	1273
6 / 1	Sens. Gnd Ph C	1 = Sensitive Ground fault picked up in Ph C	1274
6 / 2	SensGnd Forward	1 = Sensitive Gnd fault in forward direction	1276
6 / 3	SensGnd Reverse	1 = Sensitive Gnd fault in reverse direction	1277

**2.2.1.6 Fault indications**

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
6 / 4	Relay PICKUP Ph A	1 = Relay PICKUP Phase A	503
6 / 5	Relay PICKUP Ph B	1 = Relay PICKUP Phase B	504
6 / 6	Relay PICKUP Ph C	1 = Relay PICKUP Phase C	505
6 / 7	Relay PICKUP G	1 = Relay PICKUP GROUND	506
7 / 0	Relay TRIP	1 = Relay GENERAL TRIP command	511
7 / 1	Relay TRIP Ph A	1 = Relay TRIP command Phase A	507
7 / 2	Relay TRIP Ph B	1 = Relay TRIP command Phase B	508
7 / 3	Relay TRIP Ph C	1 = Relay TRIP command Phase C	509
7 / 4	21 PU forward	1 = 21 Picked up FORWARD	3719

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
7 / 5	21 PU reverse	1 = 21 Picked up REVERSE	3720
7 / 6	85-21 SEND	1 = 85-21 Carrier SEND signal	4056
7 / 7	85-21 Carr.rec.	1 = 85-21 Carrier signal received	4054
8 / 0	21 Time Out T1	1 = 21 Time Out T1	3771
8 / 1	21 Time Out T2	1 = 21 Time Out T2	3774
8 / 2	21 Time Out T3	1 = 21 Time Out T3	3777
8 / 3	21 Time Out T4	1 = 21 Time Out T4	3778
8 / 4	21 Time Out T5	1 = 21 Time Out T5	3779
8 / 5	Relay PICKUP	1 = Relay PICKUP	501
8 / 6	50BF BusTrip	1 = 50BF Busbar trip	1494
8 / 7	50(N)-B2 TRIP	1 = 50(N)-B2 TRIP	7222
9 / 0	50(N)-B1 TRIP	1 = 50(N)-B1 TRIP	7221
9 / 1	50N-3 TRIP	1 = 50N-3 TRIP	1368
9 / 2	50N-2 TRIP	1 = 50N-2 TRIP	1367

### 2.2.1.7 Auto reclose function

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
9 / 3	79 Close	1 = 79 - Close command	2851
9 / 4	79 Close 2.Cyc	1 = 79: Close command 2nd cycle (and higher)	2854
9 / 5	79 not ready	1 = 79: Auto recloser is not ready	2784
9 / 6	79 Successful	1 = 79 - cycle successful	2862
9 / 7	Definitive Trip	1 = Definitive Trip	2863

## 2.2.2 Measured values

- Ref to chap. 1.3.2 for notes regarding scaling of measured values.

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
10	Ia =	Ia	3276.7 A	601
12	Ib =	Ib	3276.7 A	602
14	Ic =	Ic	3276.7 A	603
16	Va =	Va	3276.7 kV	621
18	Vb =	Vb	3276.7 kV	622
20	Vc =	Vc	3276.7 kV	623
22	P =	P (active power)	3276.7 MW	641
24	Q =	Q (reactive power)	3276.7 MVAR	642
26	S =	S (apparent power)	3276.7 MVA	645
28	Freq=	Frequency	327.67 Hz	644
30	Va-b=	Va-b	3276.7 kV	624
32	Vb-c=	Vb-c	3276.7 kV	625
34	Vc-a=	Vc-a	3276.7 kV	626
36	PF =	Power Factor	3.2767	643
38	3I0 =	3I0 (zero sequence)	3276.7 A	610
40	INs Real	Resistive ground current in isol. systems	3276.7 A	701
42	INs Reac	Reactive ground current in isol. systems	3276.7 A	702

## 2.2.3 Fault locator

- Ref. to chap. 1.5.4 for notes regarding the fault locator.

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
44	Ia =	Primary fault current Ia	327.67 kA	533
46	Ib =	Primary fault current Ib	327.67 kA	534
48	Ic =	Primary fault current Ic	327.67 kA	535
50	Xpri =	FIt Locator: primary REACTANCE	327.67 Ω	1115

## 2.2.4 Metered measurands

- Ref. to chap. 1.3.3 for notes regarding scaling of metered measurands.

Offset	Designation of the SIPROTEC objects	Comments	Scaling ( $2^{31}-1$ corresponds to ...)	Internal object no
52	Wp+	Wp forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	924
56	Wq+	Wq forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	925
60	Wp-	Wp reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	928
64	Wq-	Wq reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	929

## Standard mapping 3-2

This chapter describes the data in the PROFIBUS-DP messages between the PROFIBUS-DP master and the SIPROTEC devices 7SA522, 7SA6 if standard mapping 3-2 is selected.

3.1	Message in output direction	32
3.2	Message in input direction	34

### 3.1 Message in output direction

#### 3.1.1 Event list

- Information regarding the handshake bytes as well as the retrieval methods of the event list via PROFIBUS-DP can be found in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile".

Offset	Designation	Comments	Internal object no.
0	Control_O	Handshake byte for event list via PROFIBUS-DP	-
1	SPARE	reserved for future use (the value at this position is ignored)	-

#### 3.1.2 Double commands

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	52Breaker OFF	Impulse output, 3 relays (2-pole ON, 1-pole OFF)	-
2 / 1	52Breaker ON		
2 / 2	Disconnect Switch OFF	Impulse output, 2 relays, 1-pole	-
2 / 3	Disconnect Switch ON		
2 / 4	Ground Switch OFF	Impulse output, 2 relays, 1-pole	-
2 / 5	Ground Switch ON		
2 / 6	Q2 Open/Close OFF	Impulse output, 2 relays, 1-pole	-
2 / 7	Q2 Open/Close ON		
3 / 0	Q9 Open/Close OFF	Impulse output, 2 relays, 1-pole	-
3 / 1	Q9 Open/Close ON		



### 3.1.3 Internal commands

- Ref. to chap. 1.5.2 for notes regarding Changing the setting group.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 2	79 OFF	Deactivation of "Autoreclosing"	2782
3 / 3	79 ON	Activation of "Autoreclosing"	
3 / 4	Pilot OFF	Deactivation of Pilot Protection	4051
3 / 5	Pilot ON	Activation of Pilot Protection	
3 / 6	<user-defined> OFF	not pre-allocated	-
3 / 7	<user-defined> ON		
4 / 0	Setting group A		-
4 / 1	Setting group A	Activation of setting group A	
4 / 2	Setting group B		-
4 / 3	Setting group B	Activation of setting group B	
4 / 4	Setting group C		-
4 / 5	Setting group C	Activation of setting group C	
4 / 6	Setting group D		-
4 / 7	Setting group D	Activation of setting group D	

### 3.1.4 Single commands and taggings

- Single commands and taggings can be routed on these position as "Source system interface" using the **DIGSI Configuration matrix**.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 0	<user-defined> OFF	not pre-allocated	-
5 / 1	<user-defined> ON		
5 / 2	<user-defined> OFF	not pre-allocated	-
5 / 3	<user-defined> ON		
5 / 4	<user-defined> OFF	not pre-allocated	-
5 / 5	<user-defined> ON		
5 / 6	<user-defined> OFF	not pre-allocated	-
5 / 7	<user-defined> ON		

## 3.2 Message in input direction

### 3.2.1 Annunciations

#### 3.2.1.1 Double-point indications

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
0 / 0	52Breaker OFF	Double-point indication ON/OFF	-
0 / 1	52Breaker ON		
0 / 2	Disconnect Switch OFF	Double-point indication ON/OFF	-
0 / 3	Disconnect Switch ON		
0 / 4	Ground Switch OFF	Double-point indication ON/OFF	-
0 / 5	Ground Switch ON		
0 / 6	Q2 Open/Close OFF	Double-point indication ON/OFF	-
0 / 7	Q2 Open/Close ON		
1 / 0	Q9 Open/Close OFF	Double-point indication ON/OFF	-
1 / 1	Q9 Open/Close ON		

#### 3.2.1.2 Single-point indications and taggings

- Protection annunciations, single-point indications and taggings can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.
- Offsets 1 / 6 and 1 / 7 are available from 7SA522, 7SA6 V04.60.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
1 / 2	<user-defined>	not pre-allocated	-
1 / 3	<user-defined>	not pre-allocated	-
1 / 4	<user-defined>	not pre-allocated	-
1 / 5	<user-defined>	not pre-allocated	-
1 / 6	<user-defined>	not pre-allocated	-
1 / 7	<user-defined>	not pre-allocated	-

### 3.2.1.3 Setting group

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 0	Group A	1 = Setting group A is active	-
2 / 1	Group B	1 = Setting group Bis active	-
2 / 2	Group C	1 = Setting group Cis active	-
2 / 3	Group D	1 = Setting group D is active	-

### 3.2.1.4 Diagnosis

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
2 / 4	Device OK	1 = Update of the device replica in the SIPROTEC device completed after initial start or restart	51
2 / 5	ProtActive	1 = At least one protection function is active	52
2 / 6	Settings Calc.	1 = Setting calculation is running	70
2 / 7	Error Sum Alarm	1 = Error with a summary alarm ON	140
3 / 0	Alarm Sum Event	1 = Alarm summary event ON	160
3 / 1	Relay PICKUP	1 = Relay PICKUP (group signal)	501
3 / 2	Relay TRIP	1 = Relay GENERAL TRIP command	511
3 / 3	Data valid	1 = Data in the PROFIBUS-DP message are valid. (This indication is created by the PROFIBUS-DP slave; not available in DIGSI and not relocatable.)	-

### 3.2.1.5 Device status

- Ref. to chap. 1.5.3 for notes regarding "Stop data transmission".

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
3 / 4	Test mode	1 = Test mode is active	-
3 / 5	DataStop	1 = Stop data transmission is active	-
3 / 6	<user-defined>	not pre-allocated	-
3 / 7	<user-defined>	not pre-allocated	-
4 / 0	ModeREMOTE	Controlmode REMOTE (0 = LOCKED , 1 = UNLOCKED)	-
4 / 1	MeasSup OFF	1 = Measurement supervision is switched off	197
4 / 2	Fail Battery	1 = Failure: Battery empty	177

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
4 / 3	Error 5V	1 = Error 5V	144
4 / 4	>FAIL:Feeder VT	1 = Binary input "Failure: Feeder VT (MCB tripped)" is active	361
4 / 5	Emer. mode	1 = Emergency mode	2054
4 / 6	<user-defined>	not pre-allocated	-
4 / 7	<user-defined>	not pre-allocated	-

### 3.2.1.6 Measurement supervision

- Offset 5 / 7 is available from 7SA522, 7SA6 V04.60.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
5 / 0	Failure Sum I	1 = Failure: Current Summation	162
5 / 1	Fail I balance	1 = Failure: Current Balance	163
5 / 2	Fail V balance	1 = Failure: Voltage Balance	167
5 / 3	Fail Ph. Seq.	1 = Failure: Phase Sequence	171
5 / 4	Fail Sum V Ph-G	1 = Failure: Voltage summation Phase-Ground	165
5 / 5	Fail V Superv.	1 = Failure: General Voltage Supervision	164
5 / 6	<user-defined>	not pre-allocated	-
5 / 7	<user-defined>	not pre-allocated	-

### 3.2.1.7 Auto reclosing and Pilot protection for Distance protection

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
6 / 0	79 not ready	1 = 79: Auto recloser is not ready	2784
6 / 1	79 Successful	1 = 79 - cycle successful	2862
6 / 2	79 Close	1 = 79 - Close command	2851
6 / 3	79 Close 2.Cyc	1 = 79: Close command 2nd cycle (and higher)	2854
6 / 4	85-21 Carr.Fail	1 = 85-21 Carrier CHANNEL FAILURE	4055
6 / 5	85-21 SEND	1 = 85-21 Carrier SEND signal	4056
6 / 6	85-21 Carr.rec.	1 = 85-21 Carrier signal received	4054
6 / 7	<user-defined>	not pre-allocated	-

### 3.2.1.8 Protection pickup indications

- Offset 8 / 6 is available from 7SA522, 7SA6 V04.60.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
7 / 0	Relay PICKUP Ph A	1 = Relay PICKUP Phase A	503
7 / 1	Relay PICKUP Ph B	1 = Relay PICKUP Phase B	504
7 / 2	Relay PICKUP Ph C	1 = Relay PICKUP Phase C	505
7 / 3	Relay PICKUP G	1 = Relay PICKUP GROUND	506
7 / 4	21 PU forward	1 = 21 Picked up FORWARD	3719
7 / 5	21 PU reverse	1 = 21 Picked up REVERSE	3720
7 / 6	Sens. Gnd Ph A	1 = Sensitive Ground fault picked up in Ph A	1272
7 / 7	Sens. Gnd Ph B	1 = Sensitive Ground fault picked up in Ph B	1273
8 / 0	Sens. Gnd Ph C	1 = Sensitive Ground fault picked up in Ph C	1274
8 / 1	SensGnd Forward	1 = Sensitive Gnd fault in forward direction	1276
8 / 2	SensGnd Reverse	1 = Sensitive Gnd fault in reverse direction	1277
8 / 3	SendGnd undef.	1 = Sensitive Gnd fault direction undefined	1278
8 / 4	<user-defined>	not pre-allocated	-
8 / 5	<user-defined>	not pre-allocated	-
8 / 6	<user-defined>	not pre-allocated	-

### 3.2.1.9 Protection trip indications

- Offset 10 / 2 is available from 7SA522, 7SA6 V04.60.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
8 / 7	Relay TRIP Ph A	1 = Relay TRIP command Phase A	507
9 / 0	Relay TRIP Ph B	1 = Relay TRIP command Phase B	508
9 / 1	Relay TRIP Ph C	1 = Relay TRIP command Phase C	509
9 / 2	50(N)-B1 TRIP	1 = 50(N)-B1 TRIP	7221
9 / 3	50(N)-B2 TRIP	1 = 50(N)-B2 TRIP	7222
9 / 4	50N-3 TRIP	1 = 50N-3 TRIP	1368
9 / 5	50N-2 TRIP	1 = 50N-2 TRIP	1367
9 / 6	50BF BusTrip	1 = 50BF Busbar trip	1494
9 / 7	Definitive TRIP	1 = Relay Definitive TRIP	536
10 / 0	<user-defined>	not pre-allocated	-
10 / 1	<user-defined>	not pre-allocated	-
10 / 2	<user-defined>	not pre-allocated	-

### 3.2.1.10 Distance protection Time Outs

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
10 / 3	21 Time Out T1	1 = 21 Time Out T1	3771
10 / 4	21 Time Out T2	1 = 21 Time Out T2	3774
10 / 5	21 Time Out T3	1 = 21 Time Out T3	3777
10 / 6	21 Time Out T4	1 = 21 Time Out T4	3778
10 / 7	21 Time Out T5	1 = 21 Time Out T5	3779

### 3.2.1.11 Single-point indications and taggings

- Protection annunciations, single-point indications and taggings can be routed on these position as “Destination system interface” using the **DIGSI Configuration matrix**.
- Offsets 11 / 1 to 11 / 7 are available from 7SA522, 7SA6 V04.60.

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
11 / 0	<user-defined>	not pre-allocated	-
11 / 1	<user-defined>	not pre-allocated	-
11 / 2	<user-defined>	not pre-allocated	-
11 / 3	<user-defined>	not pre-allocated	-
11 / 4	<user-defined>	not pre-allocated	-
11 / 5	<user-defined>	not pre-allocated	-
11 / 6	<user-defined>	not pre-allocated	-
11 / 7	<user-defined>	not pre-allocated	-

### 3.2.2 Measured values

- Ref to chap. 1.3.2 for notes regarding scaling of measured values.

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
12	Ia =	Ia	3276.7 A	601
14	Ib =	Ib	3276.7 A	602
16	Ic =	Ic	3276.7 A	603
18	Va =	Va	3276.7 kV	621
20	Vb =	Vb	3276.7 kV	622
22	Vc =	Vc	3276.7 kV	623
24	P =	P (active power)	3276.7 MW	641
26	Q =	Q (reactive power)	3276.7 MVAR	642
28	S =	S (apparent power)	3276.7 MVA	645
30	Freq=	Frequency	327.67 Hz	644
32	Va-b=	Va-b	3276.7 kV	624
34	Vb-c=	Vb-c	3276.7 kV	625
36	Vc-a=	Vc-a	3276.7 kV	626
38	PF =	Power Factor	3.2767	643
40	3Io =	3Io (zero sequence)	3276.7 A	610
42	INs Real	Resistive ground current in isol. systems	3276.7 A	701
44	INs Reac	Reactive ground current in isol. systems	3276.7 A	702
46	<user-defined>	not pre-allocated	-	-
48	<user-defined>	not pre-allocated	-	-

### 3.2.3 Fault locator

- Ref. to chap. 1.5.4 for notes regarding the fault locator.

Offset	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
50	Xpri =	Flt Locator: primary REACTANCE	327.67 $\Omega$	1115

### 3.2.4 Metered measurands

- Ref. to chap. 1.3.3 for notes regarding scaling of metered measurands.

Offset	Designation of the SIPROTEC objects	Comments	Scaling ( $2^{31}-1$ corresponds to ...)	Internal object no
52	Wp+	Wp forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	924
56	Wq+	Wq forward (Metered measurand derived from measured values)	$2^{31}-1$ impulses	925
60	Wp-	Wp reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	928
64	Wq-	Wq reverse (Metered measurand derived from measured values)	$2^{31}-1$ impulses	929

### 3.2.5 Event list

- Information regarding the handshake bytes as well as the retrieval methods of the event list via PROFIBUS-DP can be found in the manual "SIPROTEC Communication module, PROFIBUS-DP - Communication profile".

Offset	Designation of the SIPROTEC objects	Comments	Internal object no.
68	Control_I	Handshake byte for event list via PROFIBUS-DP	-
69	SPARE	reserved for future use (the value 0 is transmitted at this position)	-
70	Message block #1	Identification #1	-
71		Value #1	
72		Time stamp #1	
- 79			
80	Message block #2	Identification #2	-
81		Value #2	
82		Time stamp #2	
- 89			
90	Message block #3	Identification #3	-
91		Value #3	
92		Time stamp #3	
- 99			



# Glossary

<b>CFC</b>	Continuous Function Chart
<b>DC</b>	Double command
<b>DDB file / GSD file</b>	<p>The DDB file contains the Device Data Base (technical characteristics) of the PROFIBUS-DP communication module (PROFIBUS-DP slave).</p> <p>This file is required for configuration of the PROFIBUS-DP master and is supplied together with DIGSI.</p>
<b>DIGSI</b>	Parameterization system / parameterization software for SIPROTEC devices
<b>DP</b>	Double-point indication
<b>Input data / Input direction</b>	Data from the PROFIBUS-DP slave to the PROFIBUS-DP master.
<b>Octet</b>	Term from EN 50170, one octet corresponds to 8 bits.
<b>OLM</b>	Optical Link Module
<b>Output data / Output direction</b>	Data from the PROFIBUS-DP master to the PROFIBUS-DP slave.
<b>PNO</b>	PROFIBUS Nutzerorganisation
<b>PROFIBUS-DP</b>	PROFIBUS - Decentralized Peripherals
<b>PSE</b>	PROFIBUS interface module with (electrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
<b>PSO</b>	PROFIBUS interface module with fibre-optical interface for the SIPROTEC devices from Siemens.
<b>SC</b>	Single command
<b>SP</b>	Single-point indication



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